

- HAYES, R. O. 1953. Determination of a physiological saline solution for *Aedes aegypti* (L.). J. Econ. Entomol. 46: 624-627.
- MAEKI, K. & C. L. REMINGTON. 1960. Studies on the chromosomes of North American Rhopalocera. 3. Lycaenidae, Danaidae, Satyrinae and Morphinae. J. Lepid. Soc. 14: 127-142.

CALLOPHRYS (INCISALIA) POLIOS (LYCAENIDAE):
DISTRIBUTION IN NORTH AMERICA AND
DESCRIPTION OF A NEW SUBSPECIES¹

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Callophrys (Incisalia) polios was described by Cook and Watson in 1907. Subsequently Cook published two papers (1907, 1908) in which he identified the larval foodplant and discussed part of the life history of this insect. The egg is shown in a plate and described in the text of the 1908 paper, but the paper ends at this point with the statement "To be continued." Apparently the proposed continuation was not published. In his 1907 paper, Cook mentioned having reared *polios* to the pupal stage, but did not describe the larva or pupa. A footnote in the same paper mentions that William P. Comstock had reared *polios* from ova to maturity.

Cook and Watson described *polios* from a series of 84 specimens taken at Lakewood, New Jersey. Mention was also made of specimens from Calgary, Alberta, "Graham's Park on Rio de los Pinos, Cal.," and Colorado. These were not included in the type series. Later Cook (1908) corrected the Graham's Park locality to Colorado and indicated that "Cal." was a misprint in the earlier paper.

In the 1908 paper, Cook noted the known distribution of *polios* as New Jersey, Massachusetts, New Hampshire, Maine, Nova Scotia, Indiana,

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Alberta, and Colorado. He also listed Puget Sound (Washington), based upon Wright (1905).

Since Cook's papers, little has been published on *polios*. The butterfly is listed in a variety of checklists. Brief descriptions are included in regional works (Clark & Clark, 1951; Brown *et al.*, 1957; Shapiro, 1966). Klots (1951) provided additional distribution data for the eastern United States as did Clench for North America (1961). Holland (1931) said little about the insect.

The larval foodplant was identified by Cook as *Arctostaphylos uva-ursi* (L.) Spreng. (Ericaceae). Clench (1961) also suggested *Epigaea repens* in Pennsylvania, as did Shapiro (1966).

In 1968, we undertook a study of *C. polios* in the Rocky Mountain region, and later extended our work to include the distribution of this species in North America. Ferris has attempted several times to rear *polios*, but with little success. The foodplant in Wyoming has been identified as *A. uva-ursi*, but the females appear quite reluctant to oviposit in captivity. Oviposition has been observed at the bases of the flower buds and on the leaves of the hostplant. The ova have been adequately described by Cook (1908). In the west, the first instar larvae are pale green and covered with long fine hairs. To date, we have not succeeded in rearing beyond the first instar.

Distribution

During the course of this study, hundreds of specimens of *polios* from both museum and private collections were examined. Additional locality data were provided by a number of individuals. It soon became apparent that *polios* could be divided into two subspecies. The nominate subspecies occurs east of the 95th meridian. In the continental United States, the Great Plains appear to form a barrier between the eastern and western populations. To the north, a blend-zone occurs in Manitoba. We have reliable records of nominate *polios* from Nova Scotia, Quebec, Ontario, Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Virginia, West Virginia, Indiana, Illinois, Michigan, Wisconsin, and eastern Minnesota. As yet, we have no records from New Brunswick, Vermont, Delaware, Maryland, and Ohio, although one might expect the butterfly to occur in the mountainous areas of western Maryland, and it undoubtedly occurs in Vermont. The foodplant is rather scarce in Ohio.

The western subspecies, which is described below as a new subspecies, occurs in Arizona, New Mexico, Utah, Colorado, Wyoming, western South Dakota, Idaho, Montana, Oregon, Washington, Manitoba, Saskatchewan,



Fig. 1. Distribution of *Callophrys polios* in North America. Cross-hatched area in Manitoba indicates a blend-zone between the eastern and western subspecies. Solid dots indicate states, provinces, and areas from which collection records exist.

Alberta, British Columbia, Northwest Territory (District of Mackenzie), Yukon Territory, and Alaska. Until recently, there were no records from Montana, although the specimens listed by Elrod (1906) as *irus* (Godart) are probably *polios*, or possibly *fortis schryveri* Cross. Cook (1908) mentioned confusion among various authorities over *polios*, *irus*, and *henrici* (Grote & Robinson). In 1971, S. Kohler found both *polios* and *fortis schryveri* in Missoula Co., Montana. The occurrence of *polios* in North Dakota appears doubtful. Occasional references to the occurrence of *polios* in California probably relate to the misprint in the Cook and Watson paper, or to confusion of *polios* with *fortis* (Strecker).

Fig. 1 illustrates the presently known distribution of *C. polios* in North America. Exact locality citations are too numerous to include. The insect does not occur in the total area delineated, but is restricted to those areas within the boundary where the foodplant grows. In the west, this is generally in foothills regions; in the east, at the edges of woods and in boggy areas near the hostplant. There are certain areas where the foodplant occurs, but from which *polios* has not yet been collected. These are noted in the figure by the hatched areas. Within the overall area denoted for *polios*, various isolates occur and certain of these are noted by the inner closed lines in Fig. 1. Some of the areas between isolates appear to be unsuited to *polios*. The principal isolates encompass the following regions: northeast coastal area; Virginia-West Virginia; Illinois-Indiana; Black Hills, South Dakota; Utah; Arizona; and southern Michigan. It would appear, from Kohler's recent discovery, that *polios* has probably been overlooked in many areas in the Rocky Mountains and may be much more widely distributed in this region than present records indicate.

***Callophrys (Incisalia) polios obscurus*, Ferris and Fisher,
new subspecies**

The new subspecies differs from *C. p. polios* in two consistent characters. The dorsal color in both sexes is uniformly a distinct gray brown rather than the warm rufous brown of the eastern subspecies. The scent pad on the forewing of the males of *obscurus* is black, or darker than the ground color. In *polios*, the scent pad is generally pale, or lighter than the ground color, although there are individual exceptions in both subspecies. The maculation of the undersides in both subspecies is highly variable, and we could find no consistent characters which allow separation of *obscurus* from *polios*. Generally speaking, the hoary patches on the secondaries are brighter and more clearly defined in *obscurus* than in *polios*, and the other markings are more crisply defined. Fresh specimens should be used for comparison as fading occurs rather rapidly under exposure to strong light or elevated temperature.

Variation: The occurrence of fulvous markings in the anal area of the DHW is infrequent in males from Colorado and Wyoming. This coloring is occasionally observed in females from Colorado and Wyoming, and fulvous markings are common in both sexes of *polios* from New Jersey. Some specimens from northern Idaho exhibit about as much ruddy color as eastern *polios*, but the males have the dark scent pads of *obscurus*. Specimens from Michigan have well pronounced fulvous areas over the outer two-thirds of the DHW in a majority of the specimens examined. Some have this character on the FW as well, giving these specimens a somewhat bright appearance. Fewer Michigan specimens are dark as in New Jersey material. Ventrally, Michigan specimens tend to be lighter than either eastern or western populations.

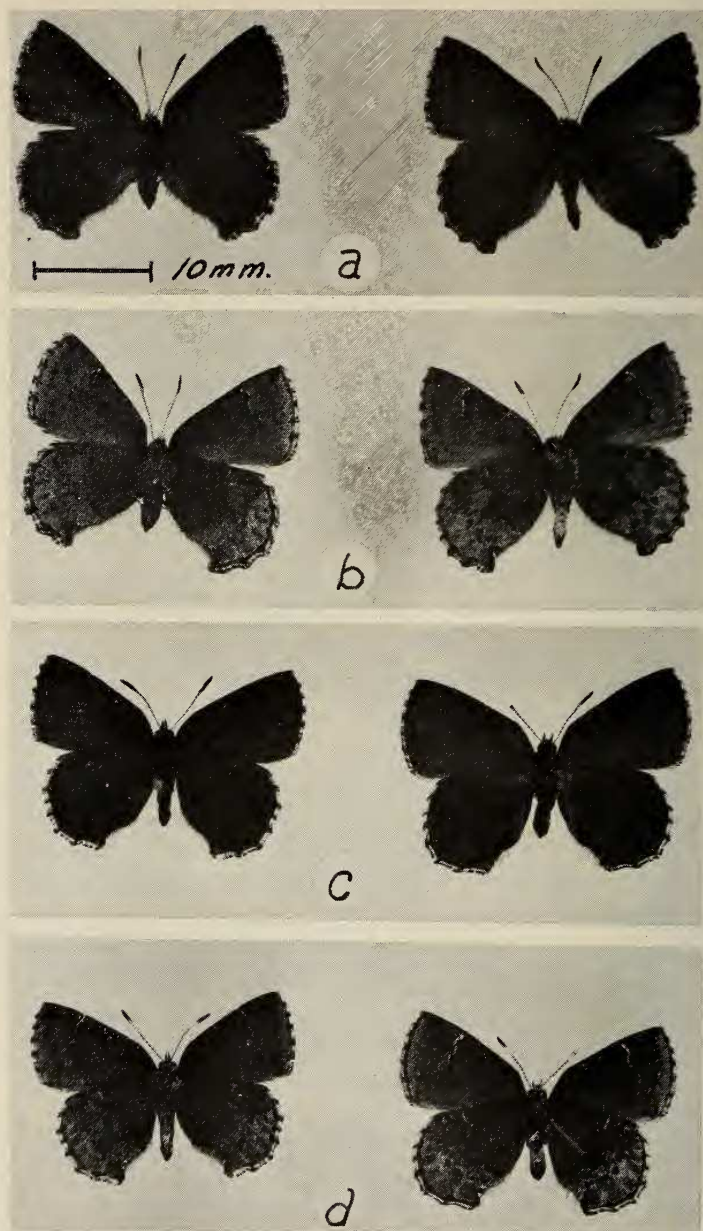


Fig. 2. *Callophrys polios obscurus* Ferris and Fisher: a. holotype ♂ (right) and allotype ♀ (left); b. same, undersides; c. specimens from Goldstream Valley, Alaska (male at left); d. same, undersides.

and the maculation appears to be somewhat frosted in aspect, producing a much less clearcut maculation than is found in specimens from other areas. This is also true, to some extent, of specimens from central Maine. Ontario specimens also have characters as described for the Michigan area, but somewhat less pronounced, which gives Ontario material a darker aspect, but not so dark as New Jersey *polios*, which is still lighter than western *obscurus*.

Specimens from Maine are generally lighter in color than New Jersey material. Manitoba specimens, especially from Sandilands Provincial Forest, are rather dark. The fulvous areas are not pronounced, but the scent pads are pale as in eastern *polios*. Some populations from eastern Manitoba may be referred to *polios* and some from western Manitoba to *obscurus*, but in the broad sense, Manitoba represents a blend-zone region. Alaskan specimens tend to be a warmer brown than *obscurus* from Colorado and Wyoming. Pale scent pads occur more frequently than in other western populations. They are closer to Maine specimens than any other of the western material. A similar situation occurs with *C. augustinus* (Westwood) from Alaska.

Holotype male. The holotype was collected on Lookout Mountain, Jefferson Co., Colorado. The male holotype bears a red label, machine printed in black ink: *C. polios obscurus*/ Ferris & Fisher/HOLOTYPIC ♂; and a white data label, machine printed in black ink with handwritten date: Lookout Mt., Jefferson Co., COLO./above Golden 6500-7200 ft./leg. Mike Fisher/14 May 68.

Allotype female. The female allotype bears a green label, machine printed in black ink: *C. polios obscurus*/Ferris & Fisher/ALLOTYPE ♀, and a data label similar to that of the holotype with the date 12 May 68.

The forewing length of both the holotype and allotype is 12.5 mm. There is remarkably little size variation in the type series.

Type series. The new subspecies is being described from a series of 168 specimens, including the holotype and allotype, from the following areas: **Colorado**, 86 specimens from Boulder, Clear Creek, El Paso, Jefferson, and Park Counties, 14 May-2 June 1957, 1960-61, 1967-71, leg. J. D. Eff, M. S. Fisher, R. J. Jae, J. Scott; **Wyoming**, 82 specimens from Pole Mountain, Medicine Bow National Forest, Albany Co., 14 May-6 June 1969-71, leg. C. D. Ferris and M. S. Fisher.

The holotype and allotype are deposited in the collection of the Los Angeles County Museum of Natural History. Paratypes are being distributed to the following museum collections: Allyn Museum of Entomology, American Museum of Natural History, Canadian National Collection, Carnegie Museum, Los Angeles County Museum of Natural History, United States National Museum, Michigan State University, University of Wyoming.

Included under the taxon *obscurus* are specimens from Washington. There is some indication (D. Frechin, Seattle, Washington, pers. comm.) that F. H. Chermock had intended to name the *polios* population from the vicinity of Tenino, Thurston Co., but we can find no record in the literature.

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LITERATURE CITED

- BROWN, F. M., J. D. EFF & B. ROTGER. 1957. Colorado Butterflies. Denver Museum, Denver.
- CLARK, A. H. & L. F. CLARK. 1951. The Butterflies of Virginia. Smithsonian Misc. Coll. 116(3).
- CLENCH, H. K. 1961. In P. R. & A. H. Ehrlich, How to Know the Butterflies. Brown, Dubuque, Iowa.
- COOK, J. H. 1907. Studies in the genus *Incisalia*. Can. Entomol. 39: 405-409.
- . 1908. Studies in the genus *Incisalia*, V—*Incisalia polios*. Can. Entomol. 39: 202-204.
- ELROD, M. J. 1906. The Butterflies of Montana. Bull. No. 10, Biological Series. Univ. Montana.
- HOLLAND, W. J. 1931. The Butterfly Book (revised edition). Doubleday, New York.
- KLOTS, A. B. 1951. A Field Guide to the Butterflies. Houghton Mifflin, Boston.
- SHAPIRO, A. M. 1966. Butterflies of the Delaware Valley. Amer. Entomol. Soc., special publication.
- WRIGHT, W. G. 1905. The Butterflies of the West Coast of the United States. Whitaker and Roy, San Francisco. (see plate XXVII, fig. 331).